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Measuring and Marketing Farm Timber

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CONTENTS

	Page		Page
Examples of marketing measured		Grades and specifications for wood	
timber.....	1	products—Continued	
Using log rules.....	2	Crossties.....	21
Estimating standing timber.....	5	Mine timbers.....	23
Partial estimates.....	8	Lumber.....	23
Estimating pulpwood.....	12	Finding the sale value of standing	
Scaling timber.....	13	timber.....	23
Board-feet.....	13	Stumpage value.....	24
Linear feet.....	16	Markets and prices.....	24
By the piece.....	16	When to sell.....	25
By the cord.....	16	How to sell.....	26
How to prevent the deterioration of		Selling by lot or lump.....	26
cut wood products.....	17	Selling by log scale.....	27
Grades and specifications for wood		Selling by count.....	28
products.....	17	Selling by lumber tally.....	28
Sawlogs.....	17	Custom sawing.....	29
Veneer logs.....	19	Timber-sale contracts.....	29
Bolts and billets.....	19	Cooperation in marketing.....	31
Poles.....	20	Practical helps in marketing.....	32
Piling.....	20	Supplementary motion pictures.....	32

Washington, D. C.

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Measuring and Marketing Farm Timber



Prepared by the Forest Service ¹

Lack of familiarity with estimating and selling timber usually puts woodland owners at a disadvantage, and frequently material from the woods is sold for considerably less than its real value. The loss to farmers is, in the aggregate, very large. In order to stop this loss, it is necessary that the farmer learn the different kinds and grades of timber products, the methods of estimating and measuring them and of ascertaining their value, the methods of selling, the markets, and the current market prices. Especially does he need reliable information about the amount and real value of his standing timber (fig. 1) and the location of good markets. It is the aim of this bulletin to assist woodland owners in getting information of this kind, so that they may market their forest products at fair prices.

The farmer or other woodland owner may also need technical assistance and advice in conducting his woods operation. When in doubt as to the harvesting and sale of a product, he should ask the local forester for advice. Often the county agricultural agent can be helpful. Private practicing foresters are available in many localities.

EXAMPLES OF MARKETING MEASURED TIMBER

Farm foresters who have advised and assisted woodland owners report that it pays to sell measured timber and to study the markets before making a sale.

For example, an owner in Kentucky was offered \$7,000 for 310 trees picked by the buyer. After consulting a farm forester, who helped him mark the trees to be sold, this owner received \$12,600 for 199 trees! The seller received and the buyer paid a fair value for the timber—both were satisfied.

In Tennessee a small forest owner delayed accepting \$1,800 for all the timber on his tract until he talked to a forester. Together, they marked \$5,000 worth of timber and left some fine young trees to renew the stand. Another harvest will be possible soon. Both the owner and the operator can stay in the timber business.

An Oregon farmer, who had been offered \$2,500 for all of his timber, harvested piling himself and sold it for \$2,700. He then sold sawlog stumpage for \$1,500 more. He received a high return for his labor.

In Iowa a buyer offered a farmer a lump sum of \$75 for all the basswood over 12 inches in diameter on a 20-acre woodland. Marking only mature trees for sale, the farmer and a forester chose trees that brought \$250 and opened the stand for faster growth of young trees. The tree crop on this land will be continuous.

¹The first edition of this bulletin was written by Wilbur R. Mattoon (deceased) and William B. Barrows. This revision was prepared with the advice of Milton M. Bryan, forester, Chief's Office, Forest Service.



F-465177

FIGURE 1.—Farmers are giving thought to the selection of trees for different kinds of marketable products.

When the owner, the timber operator, and the forester work together to grow, harvest, and sell continuous crops of trees of good quality and kinds, all are benefited.

USING LOG RULES

Wood is measured and sold by various units. The most common units are the board-foot, the standard cord, and the piece. A board-foot is the equivalent of a piece of wood 1 inch thick, 12 inches wide, and 12 inches long. A standard cord is the amount of wood that fits into a pile 4 feet wide, 4 feet high, and 8 feet long. Types of product,

markets, local custom, etc., determine specifications for wood sold by the piece. Examples of products sold by the piece are ties, poles, and posts.

To estimate the number of board-feet in logs of different sizes, log rules are used. A log rule is a statement, either in the form of a printed table or as marked on a measuring stick, of the estimated board-feet of lumber that can be sawed from logs of various lengths and diameters. Over 40 different log rules are in use, and the values assigned to logs of the same size by different rules vary considerably (table 1). In some States one rule has been legalized and must be used when no log rule is specified in contracts for selling logs; although no objection is made if the buyer and seller agree to use a different rule. In other States, however, it is illegal to use any other rule than the one specified by law.

The number of board-feet in a log 12 inches in diameter by 16 feet in length, scaled by different rules, ranges from 62 to 112 board-feet. This is a large variation. If the seller had the choice of a rule for measuring logs of this size, he would naturally select the one that gave a large value; and the buyer would, of course, prefer the rule that gave a small value.

It is very important to consider which log rule is to be used, because much depends upon the one chosen in measuring and selling timber. There is a great difference in both the amount of the timber estimated and the resulting money return.

The Doyle rule (table 2), in many sections the standard and in some States the legal rule, is unfair to the seller for measuring logs below 28 inches in diameter. In the early days of large, cheap timber it was fairly satisfactory, but for small-size timber it gives such low values that it is unsatisfactory. The Scribner rule (table 3) is fairer than the Doyle. Careful sawing, however, should produce 10 to 20 percent more lumber from second-growth timber than is credited by the Scribner rule.

TABLE 1.—*Comparison of log rules*

[The values given are for 16-foot logs only]

Top diameter of log inside bark (inches)	Contents of log in board-feet by rule stated—												
	International	Scribner	Scribner Decimal C.	Doyle	Doyle and Scrib- ner	Holland or Maine	Blodgett or New Hampshire	Humphrey or Ver- mont	Bangor	Cumberland River	Square of three- fourths	Herring	Champlain
8.....	40	32	30	16	16	44	43	43	41	31	48	34	43
12.....	95	79	80	64	64	105	92	96	100	68	108	77	105
16.....	180	159	160	144	144	179	157	171	182	121	192	142	193
20.....	290	280	280	256	256	302	240	267	300	190	300	230	308
24.....	425	404	400	400	400	439	339	384	444	273	432	344	450
28.....	585	582	580	576	582	614	457	523	609	372	588	485	620
32.....	770	736	740	784	736	795	592	683	792	485	768	655	814
36.....	980	923	920	1,024	923	1,026	744	864	(1,000)	614	972	(850)	1,038
40.....	1,220	1,204	1,200	1,296	1,204	1,261	914	1,067	(1,220)	759	1,200	(1,080)	1,287

TABLE 2.—*The contents of logs, in board-feet, by the Doyle log rule*

Diameter of log small end, inside bark (inches)	Contents, according to length of log													
	6 feet	7 feet	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet	17 feet	18 feet	
	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	
6.....	1	2	2	2	2	3	3	3	3	4	4	4	4	
7.....	3	4	4	5	5	6	7	7	8	8	9	10	10	
8.....	6	7	8	9	10	11	12	13	14	15	16	17	18	
9.....	9	11	12	14	16	17	19	20	22	23	25	27	28	
10.....	13	16	18	20	22	25	27	29	31	34	36	38	40	
11.....	18	21	24	28	31	34	37	40	43	46	49	52	55	
12.....	24	28	32	36	40	44	48	52	56	60	64	68	72	
13.....	30	35	40	46	51	56	61	66	71	76	81	86	91	
14.....	37	44	50	56	62	69	75	81	87	94	100	106	112	
15.....	45	53	60	68	76	83	91	98	106	113	121	129	136	
16.....	54	63	72	81	90	99	108	117	126	135	144	153	162	
17.....	63	74	84	95	106	116	127	137	148	158	169	180	190	
18.....	73	86	98	110	122	135	147	159	171	184	196	208	220	
19.....	84	98	112	127	141	155	169	183	197	211	225	239	253	
20.....	96	112	128	144	160	176	192	208	224	240	256	272	288	
21.....	108	126	144	163	181	199	217	235	253	271	289	307	325	
22.....	121	142	162	182	202	223	243	263	283	304	324	344	364	
23.....	135	158	180	203	226	248	271	293	316	338	361	384	406	
24.....	150	175	200	225	250	275	300	325	350	375	400	425	450	
25.....	165	193	220	248	276	303	331	358	386	413	441	469	496	
26.....	181	212	242	272	302	333	363	393	423	454	484	514	544	
27.....	198	231	264	298	331	364	397	430	463	496	529	562	595	
28.....	216	252	288	324	360	396	432	468	504	540	576	612	648	
29.....	234	273	312	352	391	430	469	508	547	586	625	664	702	
30.....	253	296	338	380	422	465	507	549	591	634	676	718	760	
31.....	273	319	364	410	456	501	547	592	638	683	729	775	820	
32.....	294	343	392	441	490	539	588	636	686	735	784	833	882	
33.....	315	368	420	473	526	578	631	683	736	788	841	894	946	
34.....	337	394	450	506	562	619	675	731	787	844	900	956	1,012	
35.....	360	420	480	541	601	661	721	781	841	901	961	1,021	1,081	
36.....	384	448	512	576	640	704	768	832	896	960	1,024	1,088	1,152	
37.....	408	476	544	613	681	749	817	885	953	1,021	1,089	1,157	1,225	
38.....	433	506	578	650	722	795	867	939	1,011	1,084	1,156	1,228	1,300	
39.....	459	536	612	689	766	842	919	995	1,072	1,148	1,225	1,302	1,378	
40.....	486	567	648	729	810	891	972	1,053	1,134	1,215	1,296	1,377	1,458	

To find the number of board-feet in a log according to the Doyle rule, deduct 4 from the diameter (in inches) of the small end and square the remainder. This gives the contents of a 16-foot log in board-feet. The number of board-feet in logs of other lengths is in proportion to their lengths; for example, an 8-foot log contains half as many board-feet as a 16-foot log, and so on.

The International rule (table 4) gives log volumes that are close to what can be sawed out by using good methods. Owners selling small logs will benefit when this or some equally close rule has come into general use. However, in many localities the low scale of the Doyle rule is made up by the operator's paying slightly more per thousand for the logs bought under that rule.

TABLE 3.—*The contents of logs, in board-feet, by the Scribner decimal C log rule*

Diameter of log small end, inside bark (inches)	Contents, according to length of log in feet											
	8	9	10	11	12	13	14	15	16	17	18	20
	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>	<i>Bd. ft.</i>
6.....	5	5	10	10	10	10	10	10	20	20	20	20
7.....	10	10	10	20	20	20	20	20	30	30	30	30
8.....	10	10	20	20	20	20	20	20	30	30	30	30
9.....	20	20	30	30	30	30	30	30	40	40	40	40
10.....	30	30	30	30	30	40	40	50	60	60	60	70
11.....	30	30	40	40	40	50	50	60	70	70	80	80
12.....	40	40	50	50	60	60	70	70	80	80	90	100
13.....	50	50	60	70	70	80	80	90	100	100	110	120
14.....	60	60	70	80	90	90	100	110	110	120	130	140
15.....	70	80	90	100	110	120	120	130	140	150	160	180
16.....	80	90	100	110	120	130	140	150	160	170	180	200
17.....	90	100	120	130	140	150	160	170	180	200	210	230
18.....	110	120	130	150	160	170	190	200	210	230	240	270
19.....	120	130	150	160	180	190	210	220	240	250	270	300
20.....	140	160	170	190	210	230	240	260	280	300	310	350
21.....	150	170	190	210	230	250	270	280	300	320	340	380
22.....	170	190	210	230	250	270	290	310	330	350	380	420
23.....	190	210	230	260	280	310	330	350	380	400	420	470
24.....	210	230	250	280	300	330	350	380	400	430	450	500
25.....	230	260	290	310	340	370	400	430	460	490	520	570
26.....	250	280	310	340	370	410	440	470	500	530	560	620
27.....	270	310	340	380	410	440	480	510	550	580	620	680
28.....	290	330	360	400	440	470	510	540	580	620	650	730
29.....	310	350	380	420	460	490	530	570	610	650	680	760
30.....	330	370	410	450	490	530	570	620	660	700	740	820
31.....	360	400	440	490	530	580	620	670	710	750	800	890
32.....	370	410	460	510	550	600	640	690	740	780	830	920
33.....	390	440	490	540	590	640	690	730	780	830	880	980
34.....	400	450	500	550	600	650	700	750	800	850	900	1,000
35.....	440	490	550	600	660	710	770	820	880	930	980	1,090
36.....	460	520	580	630	690	750	810	860	920	980	1,040	1,150
37.....	510	580	640	710	770	840	900	960	1,030	1,090	1,160	1,290
38.....	540	600	670	730	800	870	930	1,000	1,070	1,130	1,200	1,330
39.....	560	630	700	770	840	910	980	1,050	1,120	1,190	1,260	1,400
40.....	600	680	750	830	900	980	1,050	1,130	1,200	1,280	1,350	1,500

Estimating Standing Timber

The owner can estimate his timber by measuring the diameter and height of each tree and referring to a volume table, such as tables 5 and 6. Diameter is measured in inches at a point 4½ feet from the ground (called breast height), and height is measured or estimated in 16-foot logs and half logs. Diameter may be measured by means of a diameter tape, which shows the diameter directly, a cruiser's stick (fig. 2), or calipers (fig. 3). If a diameter tape is not available, an ordinary linear measuring tape can be used and the circumference

TABLE 4.—*Contents of logs, in board-feet, by the International 1/4-inch log rule*

Diameter at top end of log, inside bark (inches)	Contents in board-feet of logs having a length of—													
	8 feet	9 feet	10 feet	11 feet	12 feet	13 feet	14 feet	15 feet	16 feet	17 feet	18 feet	19 feet	20 feet	
6.....	10	10	10	10	15	15	15	20	20	20	25	25	25	
7.....	10	15	15	15	20	20	25	25	30	30	35	35	40	
8.....	15	20	20	25	25	30	35	35	40	40	45	50	50	
9.....	20	25	30	30	35	40	45	45	50	55	60	65	70	
10.....	30	35	35	40	45	50	55	60	65	70	75	80	85	
11.....	35	40	45	50	55	65	70	75	80	85	95	100	105	
12.....	45	50	55	65	70	75	85	90	95	105	110	120	125	
13.....	55	60	70	75	85	90	100	105	115	125	135	140	150	
14.....	65	70	80	90	100	105	115	125	135	145	155	165	175	
15.....	75	85	95	105	115	125	135	145	160	170	180	190	205	
16.....	85	95	110	120	130	145	155	170	180	195	205	220	235	
17.....	95	110	125	135	150	165	180	190	205	220	235	250	265	
18.....	110	125	140	155	170	185	200	215	230	250	265	280	300	
19.....	125	140	155	175	190	205	225	245	260	280	300	315	335	
20.....	135	155	175	195	210	230	250	270	290	310	330	350	370	
21.....	155	175	195	215	235	255	280	300	320	345	365	390	410	
22.....	170	190	215	235	260	285	305	330	355	380	405	430	455	
23.....	185	210	235	260	285	310	335	360	390	415	445	470	495	
24.....	205	230	255	285	310	340	370	395	425	455	485	515	545	
25.....	220	250	280	310	340	370	400	430	460	495	525	560	590	
26.....	240	275	305	335	370	400	435	470	500	535	570	605	640	
27.....	260	295	330	365	400	435	470	505	540	580	615	655	690	
28.....	280	320	365	395	430	470	505	545	585	625	665	705	745	
29.....	305	345	385	425	465	505	545	590	630	670	715	755	800	
30.....	325	370	410	455	495	540	585	630	675	720	765	810	855	
31.....	350	395	440	485	530	580	625	675	720	770	820	870	915	
32.....	375	420	470	520	570	620	670	720	770	820	875	925	980	
33.....	400	450	500	555	605	660	715	765	820	875	930	985	1,045	
34.....	425	480	535	590	645	700	760	815	870	930	990	1,050	1,110	
35.....	450	510	565	625	685	745	805	865	925	990	1,050	1,115	1,175	
36.....	475	540	600	665	725	790	855	920	980	1,045	1,115	1,180	1,245	
37.....	505	570	635	700	770	835	905	970	1,040	1,110	1,175	1,245	1,315	
38.....	535	605	670	740	810	885	955	1,025	1,095	1,170	1,245	1,315	1,390	
39.....	565	635	710	785	855	930	1,005	1,080	1,155	1,235	1,310	1,390	1,465	
40.....	595	670	750	825	900	980	1,060	1,140	1,220	1,300	1,380	1,460	1,540	

converted to diameter (table 5 or table 6, second column). Tree heights can be estimated by eye or measured with a cruiser's stick (fig. 4).

Sometimes it may be desirable to indicate the grade of each log in the tree (see "Grades and Specifications for Wood Products," page 17). Where the highest prices are paid for No. 1 logs, the difference may be enough to make it worthwhile to separate them from the No. 2 or No. 3 logs.

When each tree is estimated, it should be marked in some way, so that there will be no danger of measuring it again. Estimate the trees on an area of fairly uniform width, continuing across the tract until the other side is reached; then on the return trip the estimator

TABLE 5.—Amount of sawtimber in trees, by diameter and merchantable height, Doyle log rule

Diameter of tree, breast-high (inches)	Circumference of tree breast-high (inches)	Volume (board-feet) according to number of usable 16-foot logs								
		1	1½	2	2½	3	3½	4	5	6
10.....	31	16	20	23	24	26	-----	-----	-----	-----
11.....	35	24	30	35	38	42	-----	-----	-----	-----
12.....	38	31	39	47	52	57	60	62	-----	-----
13.....	41	42	53	64	72	80	84	88	-----	-----
14.....	44	52	67	82	93	104	109	114	-----	-----
15.....	47	64	84	104	118	132	141	150	-----	-----
16.....	50	77	101	125	143	161	174	186	-----	-----
17.....	53	92	122	152	175	198	214	230	-----	-----
18.....	57	108	144	179	206	234	254	273	-----	-----
19.....	60	126	168	210	244	278	301	324	-----	-----
20.....	63	144	193	242	282	321	348	374	417	-----
21.....	66	164	221	278	324	370	403	436	489	-----
22.....	69	185	250	315	368	420	458	497	561	-----
23.....	72	208	282	356	417	478	521	564	643	-----
24.....	75	231	314	397	466	536	583	630	725	-----
25.....	79	256	350	443	522	600	655	710	818	-----
26.....	82	282	386	489	576	663	727	791	912	-----
27.....	85	310	425	540	638	735	806	877	1,015	-----
28.....	88	339	466	592	700	807	885	963	1,118	1,258
29.....	91	370	509	648	766	884	970	1,056	1,232	1,398
30.....	94	400	552	703	832	961	1,055	1,149	1,346	1,537
31.....	97	434	599	764	906	1,049	1,154	1,260	1,469	1,684
32.....	101	467	646	824	980	1,137	1,254	1,370	1,592	1,831
33.....	104	502	696	889	1,060	1,230	1,356	1,483	1,726	1,994
34.....	107	538	746	954	1,138	1,322	1,459	1,596	1,861	2,156
35.....	110	576	801	1,026	1,225	1,424	1,573	1,722	2,012	2,322
36.....	113	615	857	1,099	1,312	1,526	1,688	1,849	2,163	2,488
37.....	116	656	915	1,174	1,406	1,638	1,811	1,984	2,330	2,675
38.....	119	697	973	1,249	1,499	1,749	1,934	2,119	2,496	2,862
39.....	123	740	1,036	1,332	1,598	1,864	2,065	2,266	2,658	3,052
40.....	126	784	1,099	1,414	1,696	1,979	2,196	2,413	2,819	3,241

Data from Mesavage and Girard, tables for estimating board-foot volume of timber. (Form class 80.)
U. S. Department of Agriculture, Forest Service. 1946.

For exceptionally tall, slender trees add 10 percent.

For exceptionally short, stubby trees deduct 10 percent.

can proceed on a fairly straight line. This makes possible the measuring of all the trees without covering too much ground. The width of the first strip on which the timber is estimated will depend upon the convenience of the operator. With open timber the width can be greater than where the trees stand close together or where there is much underbrush. Under average conditions 50 feet is a good width for the strip.

This method can also be used in estimating posts or poles or even cordwood. If posts are to be estimated, the species or kind of wood, the length, and the top diameter of each are recorded. If the facts

TABLE 6.—Amount of sawtimber in trees, by diameter and merchantable height
International 1/4-inch rule

Diameter of tree, breast-high (inches)	Cir- cumfer- ence of tree breast- high (inches)	Volume (board-feet) according to number of usable 16-foot logs								
		1	1½	2	2½	3	3½	4	5	6
10.....	31	39	51	63	72	80	-----	-----	-----	-----
11.....	35	49	64	80	92	104	-----	-----	-----	-----
12.....	38	59	78	98	112	127	136	146	-----	-----
13.....	41	71	96	120	138	156	168	181	-----	-----
14.....	44	83	112	141	164	186	201	216	-----	-----
15.....	47	98	132	166	194	221	240	260	-----	-----
16.....	50	112	151	190	223	256	280	305	-----	-----
17.....	53	128	174	219	258	296	325	354	-----	-----
18.....	57	144	196	248	292	336	369	402	-----	-----
19.....	60	162	222	281	332	382	420	457	-----	-----
20.....	63	181	248	314	370	427	470	512	580	-----
21.....	66	201	276	350	414	478	526	575	656	-----
22.....	69	221	304	387	458	528	583	638	732	-----
23.....	72	244	336	428	507	586	646	706	816	-----
24.....	75	266	368	469	556	644	708	773	899	-----
25.....	79	290	402	514	610	706	779	852	992	-----
26.....	82	315	436	558	662	767	849	931	1,086	-----
27.....	85	341	474	606	721	836	925	1,014	1,185	-----
28.....	88	367	510	654	779	904	1,000	1,096	1,284	1,453
29.....	91	396	551	706	842	977	1,080	1,184	1,394	1,588
30.....	94	424	591	758	904	1,050	1,161	1,272	1,503	1,723
31.....	97	454	634	814	973	1,132	1,254	1,376	1,618	1,862
32.....	101	485	678	870	1,042	1,213	1,346	1,480	1,733	2,001
33.....	104	518	724	930	1,114	1,298	1,442	1,586	1,858	2,152
34.....	107	550	770	989	1,186	1,383	1,537	1,691	1,984	2,304
35.....	110	585	820	1,055	1,266	1,477	1,642	1,806	2,124	2,458
36.....	113	620	870	1,121	1,346	1,571	1,746	1,922	2,264	2,612
37.....	116	656	922	1,188	1,430	1,672	1,858	2,044	2,416	2,783
38.....	119	693	974	1,256	1,514	1,772	1,970	2,167	2,568	2,954
39.....	123	732	1,031	1,330	1,602	1,874	2,087	2,300	2,714	3,127
40.....	126	770	1,086	1,403	1,690	1,977	2,204	2,432	2,860	3,300

Data from Mesavage and Girard, tables for estimating board-foot volume of timber. (Form class 80.)
U. S. Department of Agriculture, Forest Service. 1946.

For exceptionally tall, slender trees add 10 percent.

For exceptionally short, stubby trees deduct 10 percent.

are put down in this way, the value of all the posts, or of any particular class, may be easily calculated. Table 7 will be useful in estimating roughly the quantity of material in cords, ties, poles, or in sawlogs contained in trees of different diameters.

Partial Estimates

Where the woodland is so large or the time available so short that it is not practicable to measure each tree, a partial estimate can be made. One-quarter of the area may be selected as representing a fair sample of the whole. The amount of timber on this sample area may

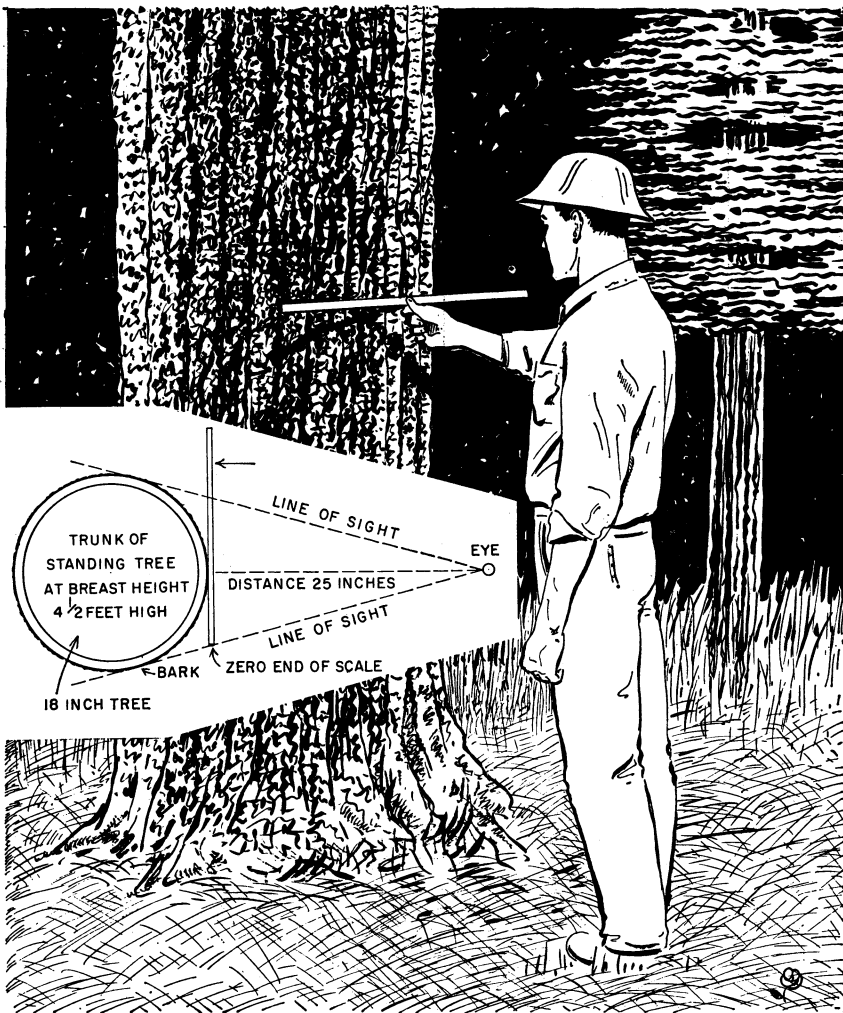
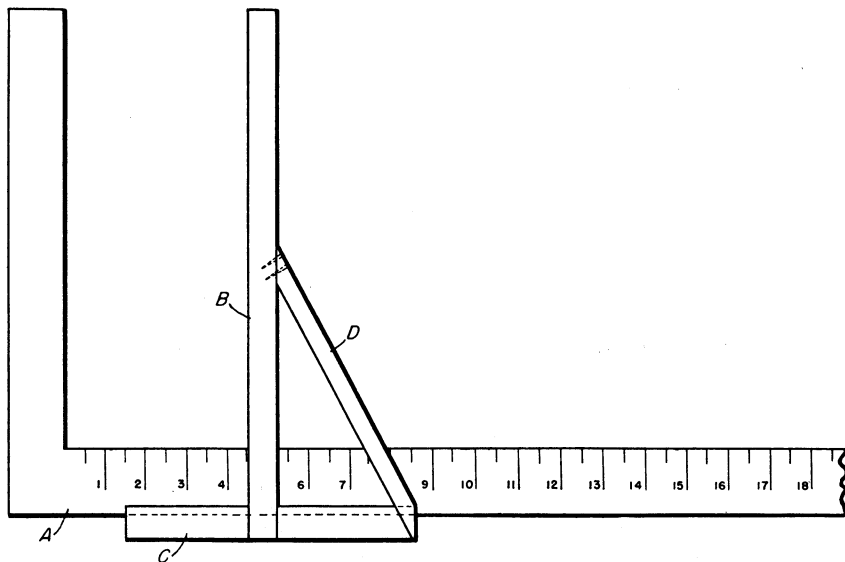


FIGURE 2.—Measuring tree diameter by use of tree-scale or cruiser's stick. If the stick is held horizontally against the trunk of the tree at a specified distance from the eye, the observer is able to read directly the diameter of the tree outside the bark. The standard is called the breast-high diameter and is taken at a height of $4\frac{1}{2}$ feet above the average level of the ground.

then be multiplied by 4 to get an estimate of the total stand on the entire tract.

Different methods of measuring part of the stand are possible. The simplest of these is to lay out at regular intervals squares or rectangles containing a quarter of an acre, or 1 acre, and to measure all the trees on these plots. If the entire woods contains 50 acres and if 10 plots of an acre each are measured, one-fifth of the area would be covered; therefore the amount of timber found on these plots would have to be multiplied by 5 to obtain the total stand.



F-316472

FIGURE 3.—Simple homemade calipers for measuring the diameters of trees.

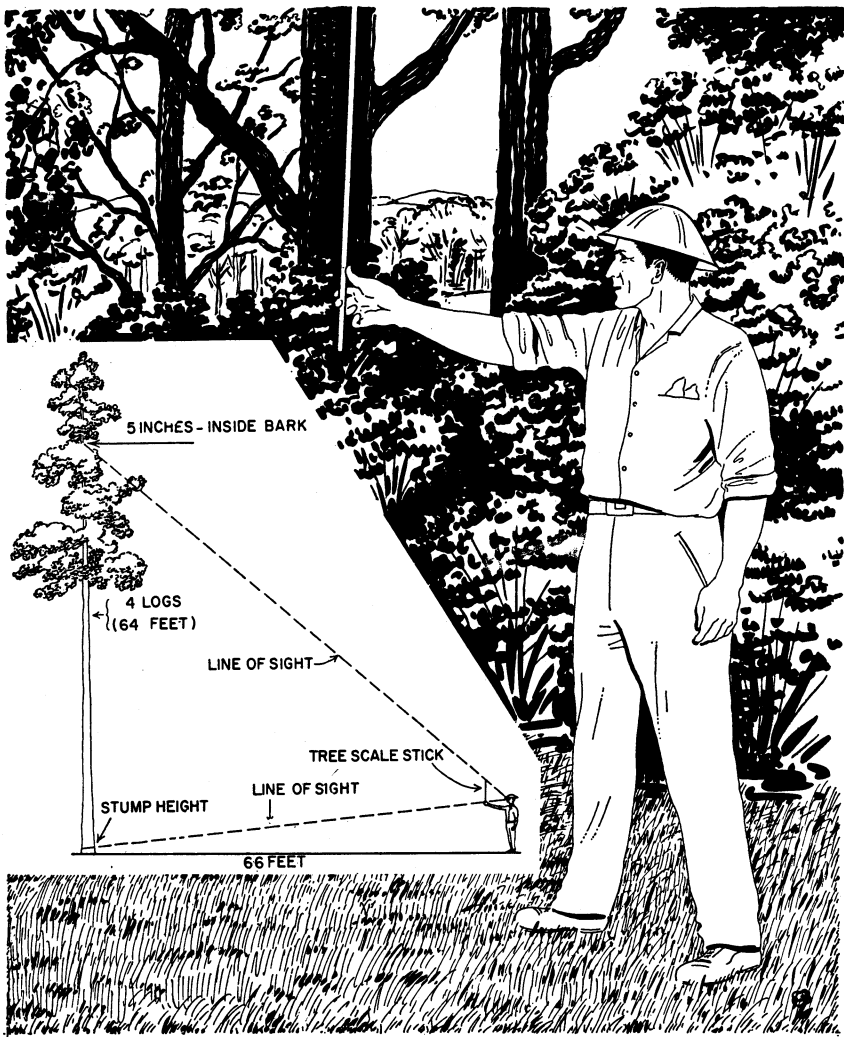
There is a tendency in locating plots of this kind to select areas where the timber is better than average. This must be avoided for accurate results.

A plot 208 feet square contains nearly 1 acre, and one 104 feet square contains a quarter of an acre. If the diameter of each tree is to be estimated and not actually measured and the estimator is working without assistance, he may stand at a given point and estimate all of the trees within 59 feet of him. The area of a circle of this size is a quarter of an acre.

A modification of the sample-plot method is the strip method. Instead of measuring plots here and there the timber on a strip 66 feet wide is measured. An area of this width and 660 feet long measures 1 acre. At the end of each acre (every 660 feet, or 10 chains) a new tally sheet is begun. The timber is estimated in a continuous strip across the tract. When the boundary of the tract is reached, the estimating crew measures off a certain distance (say, 264 feet) at right angles to the strip, and starting there continues the estimating, this time going back toward the first boundary line, and so on. This method gridirons the tract by these sample areas in such a way that almost invariably all classes of timber are tallied in their proper proportion (fig. 5).

The distance between the center lines of the strips determines what percentage of the tract is covered. If this distance is only 66 feet, 100 percent of the tract has been covered; if it is 132 feet, 50 percent of the tract; 264 feet, 25 percent of the tract, and so on.

To estimate timber by the strip method it is necessary to have two or more men in the estimating crew. The distance along the strip may be measured with a tape or chain or it may be estimated fairly closely by pacing. The tallyman walks along the centerline of the strip and



F-316473A

FIGURE 4.—Measuring tree heights by use of tree-scale or cruiser's stick. The stick is graduated so that, when held a specified distance from the eye of the observer who stands a specified distance from the tree, he can read the number of 16-foot-log lengths in the tree. The principle is that of two similar triangles.

the caliper man or estimator measures or estimates the timber on an area 33 feet wide on each side of the tallyman. If the trees are actually calipered, it takes longer, of course, than if the diameters are estimated by the second man. The estimator calls out the species, diameter, and height of the tree or the number of logs in it; and the tallyman makes the proper entries.

The greater the percentage of the tract covered by the strip method, the more accurate will be the results; as a rule at least one-quarter of the area should be included in the strips. This means that the center-lines of the strips should be not more than 264 feet apart.

TABLE 7.—Quantity of material contained in trees of different sizes ¹

Diameter of tree, breast-high (inches)	Number of trees of each size required to yield—						Tie and pole prod- uct per tree	
	1 cord			1,000 feet of lumber			Number of ties, hard- woods ⁴	Length of pole, hard- woods ⁵ (feet)
	Hardwoods		Soft- woods	Hardwoods		Soft- woods		
	Northern	Southern		Northern ²	Southern ³			
2.....		170						
3.....		90						
4.....		50						
5.....	35	25						
6.....	20	17						
7.....	15	13	20					
8.....	11	9	13			25		
9.....	8	7	10	85	66	20		
10.....	6	6	8	45	33	15	1	
11.....	5	5	7	28	22	10	1	
12.....	4	4	6	19	13	8	2	25
13.....	3.5	3.4	4.5	14	11	7	2	25
14.....	3.0	3.0	3.7	11	9	6	3.3	30
15.....	2.5	2.5	3.0	8	7	5	3.3	35
16.....	2.0	2.2	2.5	7	6	4		40
17.....	1.7	2.0	2.1	6	5	3.1		40
18.....	1.5	1.8	1.9	5	4.5	2.6		45
19.....	1.3	1.5	1.6	4	4.0	2.4		45
20.....	1.2	1.3	1.5	3.5	3.3	2.1		45
21.....	1.0	1.2	1.4	3.1	3.0	1.8		50
22.....	.9	1.1	1.2	2.7	2.7	1.7		55
23.....	.8	1.0	1.1	2.3	2.5	1.6		55
24.....	.7	.9	1.0	2.0	2.2	1.5		55

¹ From Bulletin 9, State of New York Conservation Commission (adapted in tie and pole production).² For every thousand feet of lumber about two-thirds of a cord of wood can also be cut from the tops.³ For every thousand feet of lumber about three-quarters of a cord of wood can also be cut from the tops.⁴ For every 10 ties about 1 cord of wood can also be cut from the tops.⁵ For every 10 poles about 1 cord of wood may also be cut from the tops.

NOTE.—Softwoods taken to 4 inches top diameter. Northern hardwoods: Beech, birch, and maple to 4 inches top diameter. Southern hardwoods: Chestnut, oak, hickory, basswood, ash, etc., to 3 inches top diameter.

For woodlands of 50 acres or less it is advisable to measure each merchantable tree separately. For tracts greater in size either the strip method or the sample-plot method may be used. If only a rough estimate is desired, the sample-plot method can be used to advantage, because it is quicker.

Estimating Pulpwood

Pulpwood is used for making paper, rayon, or other chemical products, pulpboard, and wallboard. Some owners sell stumpage directly to company agents or to contractors who cut the wood. Others cut the pulpwood themselves and truck it to the railroad or to the mill (fig. 6).

Pulpwood is usually measured in cords; a standard cord is a stack of wood 4 feet high, 4 feet wide, and 8 feet long (fig. 7). However, requirements of the different mills vary greatly. The forest owner

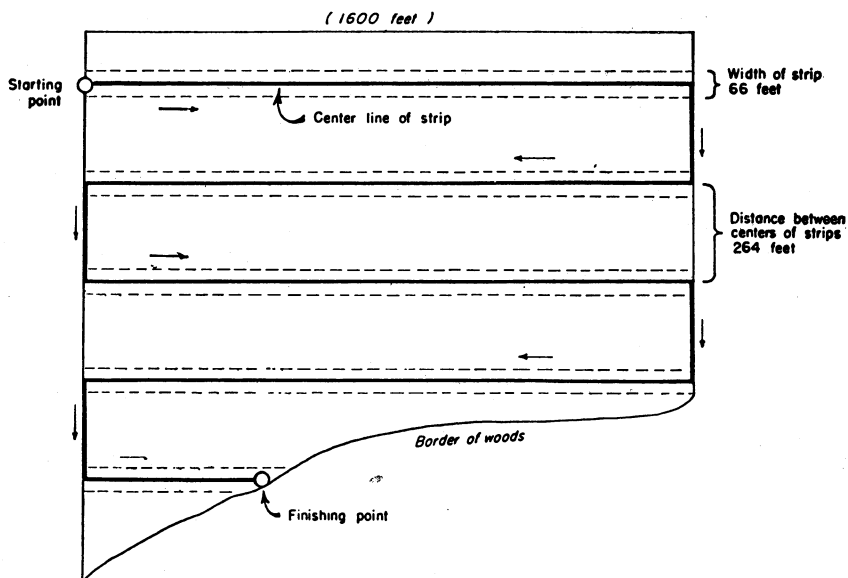


FIGURE 5.—Strip method of estimating 25 percent of a stand of timber.

who wishes to cut pulpwood should get specifications from his local forester or from the buyer.

The woodland owner can estimate the pulpwood in his standing trees about the same as he does sawtimber. He measures and counts the pulpwood trees, tallying them by total height in feet and by diameter. From figures such as those given in table 8 he can determine the number of cords each tree will yield. The forester will probably have a table that is more accurate for local conditions.

SCALING TIMBER

Board-Feet

Log lengths can be measured with a tape, a yardstick, or a sapling cut 8 feet long and notched at 1-foot intervals. An extra 3 inches of length should be allowed for trimming the rough ends of the lumber. Diameters are measured at the small end of the log inside the bark (fig. 8). If the log is not round, two or more measurements may be taken to obtain an average diameter. Diameters are rounded to the nearest inch; that is, $7\frac{1}{4}$ would be considered 7, $7\frac{3}{4}$ would be considered 8, and $7\frac{1}{2}$ should be roughly divided equally between the 7-inch and 8-inch diameters.

A log-scale stick is a wooden rule that has marked on it the board-foot contents of logs of different lengths and diameters. If much scaling is to be done, a log-scale stick should be used. However, logs can be measured with any tape or yardstick, and the board-foot values obtained from a log-scale table (table 2, 3, or 4).

The scaling of sound logs is a comparatively simple matter. Deductions should be made for defects in logs. How to estimate such losses can be learned from men of experience or by watching the sawing.



F-421010

FIGURE 6.—Loading pulpwood from trucks onto freight cars.

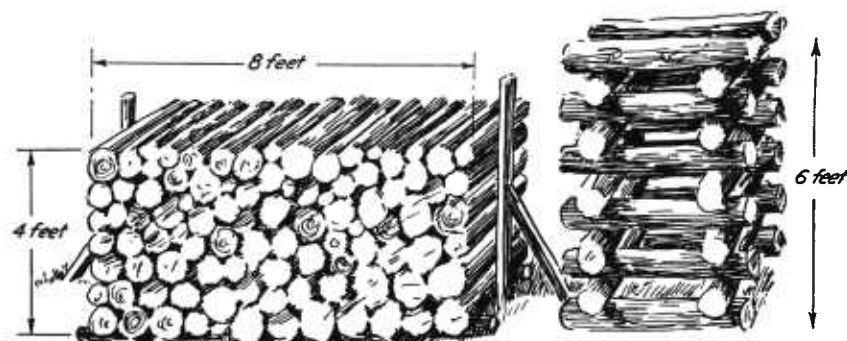


FIGURE 7.—Pulpwood measures—cord and pen.

As each log is scaled, mark it with crayon, so that there will be no danger of scaling it again. Number each log instead of marking it with a cross or other mark. Write its number on the small end.



F-462956

FIGURE 8.—Scaling the amount of sawtimber in a log by the use of a log-scale stick.

If systematic scaling is done, it is desirable to make a record of it in a scale book. This book should be ruled off in groups of four columns as shown on the form for ruling the log-scale book. Only one kind of timber should be entered on a page.

Form for ruling log-scale book

Log No.	Length	Diameter	Scale	Log No.	Length	Diameter	Scale
	<i>Feet</i>	<i>Inches</i>	<i>Board-feet</i>		<i>Feet</i>	<i>Inches</i>	<i>Board-feet</i>
1.....				5.....			
2.....				6.....			
3.....				7.....			
4.....				Etc.....			

TABLE 8.—*Volume in cords (including bark) to a variable top diameter inside bark of not less than 4.0 inches, by total height*

Diameter breast high (inches)	Volume when total height is—									Percent of total height utilized ¹
	20 feet	30 feet	40 feet	50 feet	60 feet	70 feet	80 feet	90 feet	100 feet	
	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Cords</i>	<i>Percent</i>
5.....	0.006	0.008	0.011	0.015	0.018	0.021	-----	-----	-----	23
6.....	.013	.018	.025	.032	.038	.046	-----	-----	-----	39
7.....	.021	.028	.039	.048	.058	.070	0.080	-----	-----	46
8.....	-----	.039	.054	.068	.082	.097	.111	0.126	-----	51
9.....	-----	.052	.072	.089	.108	.128	.147	.168	-----	55
10.....	-----	.066	.091	.114	.138	.163	.187	.212	0.236	58
11.....	-----	-----	.111	.140	.170	.200	.230	.265	.295	61
12.....	-----	-----	.136	.173	.210	.247	.280	.320	.357	63
13.....	-----	-----	.164	.208	.252	.297	.335	.380	.43	65
14.....	-----	-----	.192	.243	.295	.347	.40	.45	.50	67
15.....	-----	-----	.225	.285	.347	.40	.46	.52	.58	69
16.....	-----	-----	.257	.325	.394	.46	.53	.60	.67	70
17.....	-----	-----	.292	.370	.45	.53	.60	.68	.76	72
18.....	-----	-----	.328	.42	.50	.59	.68	.77	.86	73
19.....	-----	-----	.367	.47	.56	.66	.76	.86	.96	74
20.....	-----	-----	.41	.52	.63	.74	.85	.96	1.07	75
21.....	-----	-----	-----	.58	.70	.82	.94	1.07	1.19	76
22.....	-----	-----	-----	.64	.77	.91	1.04	1.18	1.31	77
23.....	-----	-----	-----	.70	.85	1.00	1.15	1.29	1.44	78
24.....	-----	-----	-----	.76	.93	1.09	1.26	1.42	1.58	78
25.....	-----	-----	-----	.83	1.01	1.18	1.37	1.54	1.72	79
26.....	-----	-----	-----	.90	1.09	1.27	1.47	1.65	1.85	80
27.....	-----	-----	-----	.97	1.18	1.38	1.59	1.80	2.00	80
28.....	-----	-----	-----	1.04	1.27	1.49	1.71	1.93	2.15	81
29.....	-----	-----	-----	1.13	1.37	1.60	1.85	2.08	2.32	82
30.....	-----	-----	-----	1.21	1.47	1.72	1.98	2.24	2.49	83

¹ This includes a stump height of 1 foot which must be deducted in estimating number of bolts. If actual percent is greater or less than that indicated, the estimated volume will be correspondingly in error.

Linear Feet

Some forest products, such as piles and mining timbers, are sold by the linear foot. This simply means that timbers of certain diameters are sold for special purposes, the price depending on the number of linear feet in the stick or the total length of the stick. It is only necessary to make sure that the diameters are those demanded by the specifications and that the lengths are measured accurately.

By the Piece

Railroad ties, posts, and some other products are usually sold by the piece. Certain maximum and minimum specifications or sizes are usually given, and the sticks that come within these sizes are counted. To keep track of the quantity, number or mark with a crayon one end of each piece as it is counted.

By the Cord

Most farmers know how to measure cordwood, but one or two points may be mentioned. It is customary to pile green cordwood 3 or 4 inches higher than the required 4 feet, in order to allow for

shrinkage and settling as the wood dries. The average height and the average length of the pile should be measured in finding the number of cords.

HOW TO PREVENT THE DETERIORATION OF CUT WOOD PRODUCTS

Logs and other round timber should never be allowed to remain long in the woods after cutting. As soon as possible they should be taken to a dry, well-aired, and shaded area and placed on skids well off the ground, or else they should be kept in water. Within a few days after the trees are felled the bark should be removed from poles, posts, and other material that will not be injured by checking or season cracks. The ends of the logs should be coated with paint, creosote, or tar. This will not only assist in preventing decay, but will also retard seasoning to some extent and thus keep the logs from checking badly.

Poles should be peeled and hauled or dragged to a place free from debris or rank vegetation and freely exposed to sun and wind. They should be rolled upon skidways not less than 18 inches high, so that no part of them rests on the ground. There should be only one layer of poles on each skidway. When ties are cut, it is usually cheapest and most desirable to haul them, unseasoned, directly to the railroad and there pile them according to the specifications furnished by the tie buyer.

Cordwood should be stacked in loose piles in a sunny, well-aired, and well-drained place free from rank vegetation. Two sticks on the ground running the length of the pile will keep it from contact with the soil and thus prevent decay in the lower layers.

Green fresh-sawed lumber kept for home use should be stacked for seasoning as soon as possible in an open, level, well-drained place. The stack should be well off the ground and piled so that air can circulate freely through it.

GRADES AND SPECIFICATIONS FOR WOOD PRODUCTS

Sawlogs

Logs may be sold by sizes and grades or without classification by the lot. Selling "woods run" is simple and direct but offers good opportunity for speculation, usually to the advantage of the buyer whose knowledge of timber is better than that of the seller. This method is advisable only after the owner has made a careful estimate of the amount and quality of the standing timber. Selling by sizes and grades, when these are defined in the contract, often brings larger money returns than if the material were not sized and graded.

The grade of a log depends upon its dimensions, quality, and freedom from defects. Logs are inspected for the number and character of standard defects, which determine the grade, and are measured by taking the length and the average diameter at the small end. Large logs are more valuable than small ones of the same grade (fig. 9).

For example: In one market, medium grade 10-foot red oak logs from 16 to 30 inches in diameter are worth \$35 to \$40 per 1,000 feet;

logs from 31 to 36 inches in diameter, \$40 to \$45; and logs 37 inches and over in diameter, \$45 to \$50. Logs with only slight defects or none are worth more than these prices, and logs with more defects are worth less.

Defects recognized by the lumberman as standard are knots, rot, shakes, season checks, frost cracks, sun scald, fire scars, seams, wormholes, stain, spiral or crooked grain, cat faces, and crook in the log. In general, grading is more common and the number of grades is larger for the more valuable woods than for the inferior kinds. The local forester will have information on log grading.

The recognition throughout a State or region of a few standard grades and sizes for logs of various kinds of trees would be of great assistance in the marketing of farm timber. It would afford common ground on which the buyer and seller might meet.



F-427747

FIGURE 9.—High-grade logs from farm woodlands, such as these of black walnut, can be profitably shipped to outside markets.

In addition to standardizing log grading rules for softwood species, the U. S. Forest Products Laboratory, Madison, Wis., has published a set of hardwood log grades² that have proved very acceptable in all parts of the country where they apply. It would be well for any farmer who is planning to sell hardwood timber to study this publication.

² U. S. Forest Products Laboratory. *HARDWOOD LOG GRADES FOR STANDARD LUMBER AND HOW TO APPLY THEM.* (Pocket ed.) U. S. Forest Products Laboratory Rpt. No. D1737-A, 16 pp., illus. 1949.

Veneer Logs

The veneer industry secures most of its raw product as logs and flitches (large-size pieces sawed from logs). Both are sold by the thousand board-feet. The specifications are not uniform. The essential points refer to the species, size of the logs, and grade of the wood. Diameters of hardwoods usually measure from 14 inches up, and lengths from 6 to 16 feet. Logs must be cut 3 inches over the specified length to allow for trimming. The rules for yellow-poplar given below will serve as an illustration of grading, although to make the specifications complete the defects would have to be defined. Few logs meet the requirements of the No. 1 grade, and the buyer exercises discretion in departing more or less from this standard.

No. 1 yellow-poplar logs must be straight grained and free from knots, crook, cat faces, wind shakes, rotten center, double hearts, hearts grown to one side, and other defects. These specifications apply to logs up to and including 12 feet in length; logs 14 and 16 feet long may have one defect not over 6 inches in diameter; logs over 16 feet long may have two defects not over 6 inches in diameter; also a log may have a hole in the center not greater than one-fifth of the diameter of the log.

No. 2 yellow-poplar logs must be the same as No. 1, except that they may have defects not to exceed one-third of the circumference.

Cull logs are those that grade poorer than No. 2.

The seller may command full price when logs are freshly cut, but logs that have deteriorated from exposure are not desirable under any circumstances and will at no time bring any but low prices. Diameters will be measured across the top end of the log and the contents scaled by the log rule agreed on (see pages 3 to 6).

Bolts and Billets

Bolts are short portions of logs. Billets are obtained by halving, quartering, or otherwise splitting or sawing bolts or short logs lengthwise. Handle blanks and cooperage blocks are good examples of billets. In the southern pine region the terms bolts and billets mean exactly the opposite of these definitions. Billets there are short, round logs. Because splitting causes great waste, it has been largely superseded by sawing. For example, a cord of average-sized hickory bolts that will yield only about 700 rived billets may be sawed into 900 billets. Bolts and billets are used for such products as cooperage (fig. 10), woodpulp, excelsior, woodenware (pails and tubs), handles, vehicle parts, some agricultural implements, fruit and vegetable packages, athletic goods, and pencils.

Bolts are measured and sold by the cord, by the linear foot, and by the board-foot. If 12 inches or over in diameter, they are usually sold by board measure. Billets are frequently sold by the piece or count, particularly if sawed and of uniform size, or are stacked and measured in cords, either standard or short cords of specified width.

The grades and specifications used in slack cooperage are very numerous; but the forms and qualities for tight-cooperage stock, including staves, hoops, and heading, are much restricted. Specifications refer to the species, length, width, thickness, and soundness of timber.



F-469358

FIGURE 10.—Stave bolts of white oak being skidded to the road.

White oak is the principal wood used in manufacturing tight cooperage in the eastern part of the country; Douglas-fir is used in the Northwest. However, many different kinds of wood may be made into barrels for dry or solid products (slack cooperage).

For handle stock, the specifications call for second-growth straight, sound bolts or billets of specified length. Ash bolts for farm-tool handles are mostly from 30 to 60 inches in length. Hickory in these sizes but including shorter lengths is bought for handles for hammers, axes, and other articles.

Poles

Southern pines furnish the bulk of the southern and eastern pole timber; Douglas-fir, western redcedar, and western pine supply this need for the rest of the country. Specifications for poles define the quality that is acceptable for poles, as well as dimensions, straightness, and some manufacturing details. Pole and piling specifications vary so much that the owner should know exactly what the buyer expects, before the timber is cut.

Piling

The classification or grading of piling depends largely upon its use, whether in fresh water, salt water, or on land, and upon its form and size. Very often the kind of wood is not specified, and the requirements refer to straightness, length, and butt diameter measured 3

feet from the end. Specifications are sometimes rather brief and simple, and piling then becomes one of the easiest classes of timber to grade for the market.

Piling is sold at a stated price per linear foot for specified dimensions and kinds of wood. The price increases rapidly with increase in length and in desirability of form or taper. Handling and transportation costs are large because of the heavy weight of sticks of this size.

Crossties

The specifications for railroad ties are usually for sound timber of good quality, stripped of bark, and free from imperfections that would impair their strength and durability, such as shakes and loose or decayed knots. The ties must be sawed or hewed smooth on two parallel faces, and the ends must be cut square. Pole ties are made of round timber on which are hewed two parallel faces; square ties are hewed or sawed into rectangular shape (fig. 11). Most ties produced now are sawed.

Ties are classified according to the species of wood, its wearing and lasting qualities and need for preservative treatment, and the thickness and width of face, or dimensions. Practically all crossties used by the class I railroads are now treated with a preservative to prevent decay.



F-457579

FIGURE 11.—Crossties are an important farm-timber crop in general demand.

Standard-gage ties are either 8, 8½, or 9 feet long. There are six sizes of ties, No. 6 being the largest. Size 1 is a round-edge tie, 6 by 6 inches, hewed or sawed top and bottom, whereas size 6 is 7 by 10 inches, sawed or hewed either on all four sides or only on the top and bottom (see fig. 12).

Before cutting ties the forest owner should know the buyer's specifications and the kinds of wood that will be accepted.


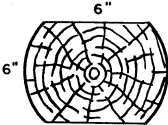
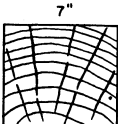
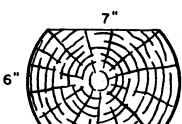
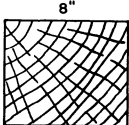
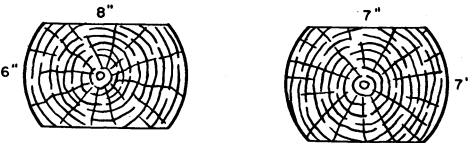
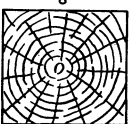
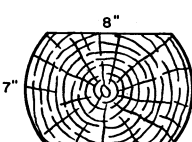
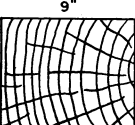
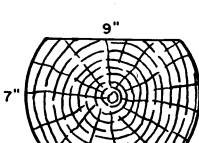
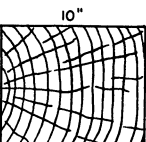
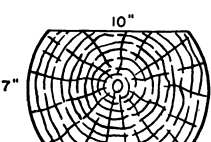
SIZE	SAWED OR HEWED TOP, BOTTOM, AND SIDES	SAWED OR HEWED, TOP AND BOTTOM
1		
2		
3		
4		
5		
6		

FIGURE 12.—The above are minimum dimensions. Ties over 1 inch more in thickness or in width will be degraded or rejected. Width is measured on the top of the tie. The top is the narrower of the horizontal surfaces, or if surfaces are equally wide, the one having narrower width of heartwood.

One man can make ties, but two naturally work to better advantage. Wedges, an ax, broadax, and measuring stick are needed besides a crosscut or a bow saw. A one-man power chain saw will make the job easier and will complete the job more quickly. Ties are usually sawed square instead of hewed; sawing is faster and more accurate. It is best to consult the local forester or tie buyer in your area before making ties.

Mine Timbers

Many species and sizes of timber are used in mines.

Mine props are round timbers used as main supports for the roofs and sides of tunnels; in diameter they vary from 4 to 14 inches, and in length mostly from 3 to 12 feet.

Lagging is round timber about 3 inches in diameter and 7 feet in length, used to fill in behind the props and caps to form the sides and roofing of the tunnels. Bars are extra long lagging.

Caps are hewed or sawed pieces of timber of different sizes laid across the tops of pairs of props as a support for the roof lagging, which runs lengthwise in the tunnel.

Sills as foundation for props are from 8 to 14 inches in diameter. Although they are often of sawed material, square hewed timbers are much used.

Mine ties, including tramroad, motor, and heading ties, are ordinary track ties, 4 inches on the face and varying in length mostly from 3 to 5 feet.

Rough lumber goes into mine rails, collar timbers, brattice or partition boards, stringers, and sills.

Lumber

Specifications for the grading of lumber state the quality and size, in addition to the kind of wood. Wood-manufacturing concerns now buy their rough stock lumber mostly by grade and dimension instead of "mill-run." This bulletin cannot give a detailed discussion of grading, because it is rather complicated. The basis for grading is the quality of the lumber as determined by the number and size of standard defects, such as knots, shake, wormholes, dote, and stain, and also by the width of the piece.

In the lumber market, grades have been more or less standardized for each species by the various manufacturing associations. Information on the grading of lumber will be furnished upon request to the Forest Products Laboratory, Madison, Wis.

FINDING THE SALE VALUE OF STANDING TIMBER

The value of a standing tree is mainly determined by the kind or species and its size, soundness, straightness, and location or accessibility to market.

The following may help in getting information about marketing timber in your area:

1. Contact your local public forester, if one is available.
2. Consult any of your neighbors who have sold timber recently or who might know about markets and current prices.

3. Employ a private consulting forester.
4. Write to buyers outside your local area who might offer a better price for your timber products than local markets do.

Stumpage Value

The sale value of standing timber, known as its stumpage value, is of primary importance to the owner. Many small timber sales are based upon the value of timber in the standing tree, rather than on its later value when cut and placed on the market in the form of cordwood, ties, poles, bolts, logs for further manufacture, or lumber. Stumpage value of timber is affected by its species, quality, quantity, location, and accessibility as well as the current price on the local market.

Since location and accessibility affect the value of timber, they also largely determine the cost of production and marketing. The distance, character of the road, and daily hauling capacity of a truck are factors to be considered. Through improved methods of logging and transportation, timber becomes relatively more accessible and the cost of production is reduced—its stumpage value being then increased. Efficiency of labor, teams, tractors, and machinery employed in logging, economy in utilizing material and conducting the operation, and skill in securing the best market for the product, whether sold in the log or in a manufactured state, all count as factors in raising the value of standing timber.

If the owner takes part in the lumbering, his profits from stumpage are increased by the extent to which his labor and capital go into the logging, milling, and marketing of the product. Power chain saws, now generally available, make it easier for an owner to cut his timber crop. Records kept by farmers show that wages earned for cutting, logging, and hauling their own timber range from \$1.59 to \$7.65 per hour. Under certain conditions the owner may be able to sell the sawed product of his woods without outside help. Usually he is not sufficiently equipped or experienced to accomplish this profitably. He is often able, however, to market his timber direct to the consumer in the form of logs, bolts, poles, piling, and cordwood.

In general, an advance in stumpage values of all woodland products has been in progress throughout the country. It would be very profitable for the farmer to become thoroughly familiar with the general market conditions and stumpage values and to place a corresponding value on his timber before making further sales or even using his timber locally.

MARKETS AND PRICES

The farmer's market will be found at a sawmill, lumber yard, woodworking plant, railroad station or siding, mining company, electric-light company, traction company, or general contractor's office. The market may be located nearby or some distance away.

It is well to have clearly in mind the different prices of wood products as they advance successively from the tree to mill and market. Thus the stumpage price and the market or base price stand at the two extremities (fig. 13). Local and f. o. b. prices are intermediate prices. By "local" price is often meant that which the buyer would



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FIGURE 13.—Transportation cost is an important item in figuring the value of a woods product.

pay for wood material delivered at the railroad or other supply point. The "f. o. b." price is the price of material "free on board" cars at some point designated, as f. o. b. mill or f. o. b. railroad. It equals the base price, or price on the general market, minus the cost of freight from the shipping point to the market point.

Market prices of timber products may be learned from farm foresters, State foresters, extension foresters, county agents, consulting foresters, mills, lumber yards, and jobbers, most of whom maintain lists of timber operators and buyers in their localities.

For prices and specifications on crossties, requests should be made of the local railroad agent or direct to the general purchasing agents, whose addresses can be obtained from the passenger-service folders or learned by inquiring at the local stations. Mining companies furnish similar information of their needs. Poles are purchased by electric-power companies, electric-traction companies, telegraph and telephone companies, and others, to whom requests for information should be sent direct. For prices on piling it would be well to inquire from the railroad companies and the dock, wharf, bridge, and bulkhead contractors in the larger towns and cities.

WHEN TO SELL

Woodland owners do not always know when to sell standing timber and when to use it for local needs. In some localities it always pays the farmer better to sell the timber, particularly the more valuable kinds. For example, in the central hardwood region farmers

sell their select yellow-poplar trees profitably, then purchase southern pine siding for their houses and barns and haul it 4 to 8 miles to the farm. Too often choice white oak of the best quality for veneer or furniture stock is sawed into posts for the farm.

The owner should keep in touch with market conditions in order that he may sell his product to the best advantage. Rarely is the timber dying, decaying, or "going back" because of fungus or insect attack at the rapid rate alleged by buyers, who naturally wish to buy as cheaply as possible; and, unless it is overmature, it is increasing yearly in volume and value. To cut during the early period of tree growth often represents a sacrifice in financial returns. The approximate age at which trees should be cut in order to secure the highest net money returns per year is very different for the various species. Thus cottonwood, ash, and yellow-poplar become commercially valuable at much earlier ages than white oak and black walnut.

When other farm work is least pressing, the farmer should estimate, measure, cut, market, and sell his timber. Winter is usually a favorable season. It is easier to haul logs on the snow than over ordinary roads, and the logs are less likely to deteriorate quickly by attacks of insects and fungi than at any other time of the year. The farm or local forester should be called for advice as to when timber is ready for cutting or sale. If the woodland is larger than he is permitted to advise on, he will suggest a private practicing forester who can help the owner solve his selling problems. In some localities pulp companies employ "conservation foresters" who help woodland owners when timber is ready for harvest and sale.

HOW TO SELL

In managing his woodlands, the farmer or owner needs to keep in mind that his crop of rough timber products may include logs, bolts and billets, piling, poles, crossties, posts, and cordwood. The farmer should as far as possible cut or harvest his own crop of rough products. Thus, along with his timber he will sell his labor and the use of his team or truck. He should, as a rule, stay out of the sawmill business. The exception is the farmer who carries on a sawmill business during the off months, providing winter work and a supply of lumber for himself and the community.

The choice of selling methods will depend largely upon the kind of timber and the owner's knowledge of its value, his past experience, and the condition of the market. Timber products are sold either in the standing tree or in a more or less roughly manufactured condition. Except when sold by the lot or lump, sales are based upon a measure by log scale or lumber tally or upon individual count of units of designated size or character.

Selling by Lot or Lump

Timber sold by the lot, boundary, or tract is either "lumped off" to include a designated area or sold on an acreage basis.

This method has prevailed over all others, particularly in the less settled districts. As a rule the purchaser strongly favors it because

in such a transaction his better knowledge of both timber yields and values gives him an advantage over the average owner. Many examples can be found of the owner's sacrifice of a large share of the timber value. This is true of nearly any wooded region. Because of great competition among purchasers, the presence of trained foresters to advise the owners, and an increase in timber values, the sales of standing timber by the lot or lump now bring better profits than formerly.

In using this method it is very important in advance of the sale (1) to secure a reliable estimate of the amount, quality, and unit value of each kind of product to be sold; (2) to get bids from as many buyers as possible; and (3) to have an agreement clearly specifying the restrictions in regard to the manner and amount of cutting, so as not to impair the producing power of the forest. Timber-sale contracts are described in a later section. The sale may include only trees above a specified minimum diameter limit, or such trees as have been previously marked by the owner for cutting. When protected in the manner suggested above, this method becomes one of the safest and most satisfactory of all selling methods and should be fully considered when sales are contemplated.

Selling by lump avoids the misunderstandings that may occur in sales by log-scale measurement or lumber tally. If competition is keen, it is likely that nearly the full value of the timber will be offered in the bids. By this method, however, the owner forgoes the opportunity of profitable employment for himself and his equipment, which he would have if he logged the material and sold it at the mill or shipping point.

Unless restricted by the terms of the agreement, the buyer usually cuts nearly all the trees. Selling by the lot is therefore a good method where the owner intends to clear the land for other uses. If the land is to be kept in timber, the owner should make provision in the contract of sale to retain sufficient control over the logging operations to protect the forest stand and provide for future crops. The importance of care in cutting, because of its effect upon the succeeding growth and production of the stand, can hardly be overstated. The local forester or the county agent can furnish samples of timber-sale contracts. He will often help the owner mark the trees to be cut and estimate their value.

Selling by Log Scale

Standing trees are sometimes bought on the basis of board-foot scale, to be measured after the trees are felled and cut into logs. The chief concern of the owner is to determine in advance the true value and price to be charged per unit of measure. This may be secured as an average or "woods run" for the entire lot, or a separation by species and, if desired, by grades under each. The latter is the more accurate and satisfactory method (see p. 17). The owner has the choice of selling only selected and marked trees, or all trees above a certain diameter limit and none others, or all merchantable trees. Selling only marked trees gives good results when the selection is properly done; selling to a diameter limit follows in preference; selling all merchantable

trees should not be done, but should be restricted to sales by the lump or lot, in order to secure full utilization of the lower grades. The local forester can recommend the method that best suits the particular woodland.

Because the average farmer is not usually equipped to conduct an extensive timber business, he chooses a method that is best for making small sales, often of the higher priced woods, such as white oak, yellow-poplar, white ash, or black walnut. In many sales the owner cuts and delivers the logs to the mill or shipping point. One of the most common practices is the selling of standing timber for which the farmer is paid the amount determined by scaling the cut logs. In selling by the log, the owner who measures and grades his timber,³ even though he does it roughly, has an advantage over one who accepts without a check the scale and inspection of the purchaser. When the owner cannot check the scale or the cutting of the logs, the buyer is likely to take only the high-grade logs and leave those of low grade in the woods. Before closing the sale the buyer and seller should have an agreement as to what is a merchantable log.

If the owner does not have sufficient experience, it will usually pay him to ask the farm forester for assistance or, if necessary, hire a private consulting forester to give him instruction in the work.

Selling by Count

Poles, piling, crossties, small mining timbers, and cordwood are sold by individual count of units of specified sizes. The smaller sizes of bolts, for example, are sold the same as fuelwood by the cord. Because of its simplicity and ease of application, this method has much to recommend it for use wherever it can be applied in timber sales.

Selling by Lumber Tally

There are two ways of selling timber at the mill. By one method, the owner takes no part in the logging and sawing, but disposes of his standing timber at a stumpage price per thousand feet of lumber actually produced at the mill. This method of sale is desirable where conditions are such that the material can be more easily or more reliably measured and checked after leaving the saw than while in the log. It is more applicable also to stands of timber consisting only of a few species than to a mixture of many different kinds. The seller should check the lumber tally unless he is absolutely sure that there will be a fair scale. A contract should always be made between the buyer and seller when timber is sold by this method.

By the other method the owner personally takes charge of the logging and milling and markets the manufactured product. If successful in marketing, he secures the full value of his stumpage and, in addition, a share in the profits derived from the operations of logging and manufacturing. Time, knowledge, and experience necessary to supervise the actual work or to contract for parts of it, and capital to finance and carry on the work are requisites.

³ See p. 5 for scaling and p. 17 for grading.

Custom Sawing

Sometimes an owner can contract to have his logs sawed into lumber at a local mill or at a portable mill set up on his property. Then he can select whichever pieces he wants for his own use and sell the rest to a lumber buyer.

Timber-Sale Contracts

The owner should draw up a written contract covering every sale of farm-timber products (fig. 14). Even in small sales much trouble and financial loss have resulted from failure to put the terms of the sale in writing. Even though both parties are honest, a contract will enable them to avoid many misunderstandings that might arise.

The primary aim of the seller should be to make absolutely clear the conditions under which he desires to dispose of his product. The essential provisions in a timber-sale contract are (1) description and location of the timber; (2) price and manner of payment; (3) conditions of cutting and removal; and (4) title and means of settling disputes. Under item 3 are stated the provisions regarding the duration of the contract, the marking of the timber, the diameter limits, the method of scaling, merchantability, the degree of utilization, and protection against injury.

As an aid to those unfamiliar with such agreements, a sample contract is given, showing the more important provisions that should be included in a contract for the sale of marked trees. No single form of contract will suit all classes of sales, but owners of woodland timber should have no difficulty in adapting this one to their use.



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FIGURE 14.—Although this choice white oak timber was located only about a mile from the railroad siding, the owner sold it for one-third of the amount his neighbor received for similar timber at a greater distance. Both sold to the same buyer, but the neighbor knew the current market and had the advice of the local forester.

Sample Timber-Sale Agreement

-----, of -----,
 (I or we) (Name of Purchaser) (Post Office)
 -----, hereinafter called the purchaser, agree to
 (State)
 purchase from ----- of -----,
 (Seller's name) (Post Office)
 -----, hereinafter called the seller, the designated
 (State)
 trees from the area described below.

I. Description of Sale Area:

(Describe by legal subdivisions, if surveyed, and approximate, if not)

II. Trees designated for cutting: (Cross out A or B—use only *one* clause)

A. All ----- trees marked by the seller, or his agent, with
 (Species)
 paint spots below stump height; also dead trees of the same species which are
 merchantable for -----
 (Kind of forest products)

B. All ----- trees merchantable for -----
 (Species) (Kind of forest products)
 ----- which measure ----- inches or more outside the bark at a point
 not less than 6 inches above the ground; also other ----- trees
 (Species)
 marked with paint spots below stump height by the seller or his agent.

III. Conditions of Sale:**A. The purchaser agrees to the following:**

1. To pay the seller the sum of \$----- for the above-described
 trees and to make payments in advance of cutting in amounts of at least \$-----
 ----- each.

2. To waive all claim to the above-described trees unless they are cut and re-
 moved on or before -----
 (Date)

3. To do all in his power to prevent and suppress forest fires on or threatening
 the Sale Area.

4. To protect from unnecessary injury young growth and other trees not
 designated for cutting.

5. To pay the seller for undesignated trees cut or injured through carelessness
 at the rate of \$----- each for trees measuring 10 to ----- inches
 in diameter at stump height and \$----- each for trees -----
 inches or over in diameter.

6. To repair damage caused by logging to ditches, fences, bridges, roads, trails
 or other improvements damaged beyond ordinary wear and tear.

7. Not to assign this agreement in whole or in part without the written con-
 sent of the seller.

B. The seller agrees to the following:

1. To guarantee title to the forest products covered by this agreement and to
 defend it against all claims at his expense.

2. To allow the purchaser to use unmerchantable material from tops of trees
 cut or from trees of ----- species for necessary logging improve-
 ment free of charge, provided such improvements are left in place by the pur-
 chaser.

3. To grant the freedom of entry and right-of-way to the purchaser and his employees on and across the area covered by this agreement and also other privileges usually extended to purchasers of stumpage which are not specifically covered, provided they do not conflict with specific provisions of this agreement.

C. In case of dispute over the terms of this agreement we agree to accept the decision of an arbitration board of three selected persons as final. Each of the contracting parties will select one person and the two selected will select a third to form this board.

Signed in duplicate this ----- day of ----- 195---

(Witness)

(Purchaser)

(Witness)

(Seller)

(Witness)

(Witness)

COOPERATION IN MARKETING

There is a definite need for cooperation among owners in the selling of woodland products. The average farmer by himself is at a great disadvantage, because caring for growing timber, selecting trees for cutting, and finding the best market are often unfamiliar to him.

Because the farmer or other small timber owner finds the cost of sorting and marketing small amounts of the more valuable forest products to be prohibitive, he is often obliged to cut choice woods into inferior products; for example, he may find it necessary to turn clear white oak or black cherry into railroad ties and sell his material at a great sacrifice to a local buyer—a middleman. Several farmers acting cooperatively could market their black walnut logs, basswood, hickory, or oak bolts, piling, pulpwood, or other products direct to the wholesaler, manufacturing plant, or user at profits much larger than those received from individual sales.

The services of a reliable and experienced forester as an adviser would be extremely helpful to the majority of farmers. The services of such a man, who is known to be working in the interests of the farmer, are needed: (1) To advise and assist in estimating the contents and market value of woodlands. The owner will then be in a better position to decide how to sell most profitably. (2) To advise on the marketing of timber in carload or truckload lots for delivery to manufacturing or shipping points. Such an adviser, whether he be the local farm forester or a private consulting forester, will be much better informed on how to secure current market prices than the average farmer.

Groups wanting a cooperative organization can secure assistance and information as to methods and procedure from the marketing specialists of the State departments of agriculture and of the United States Department of Agriculture.

PRACTICAL HELPS IN MARKETING

The following suggestions may be helpful in the selling of timber products:

Find out from as many sawmills and wood-using industries as possible what prices they offer for various wood products, in order that advantage may be taken of the best market. This applies to sales requiring shipment as well as to local sales.

Before selling, inquire from neighbors who have recently disposed of their timber and use their experience as a guide. Consult your local forester or county agent. Failure to do this has often resulted in not getting the full value of the product.

Thoroughly investigate all local timber requirements and prices, since many local markets pay better than outside markets because of the saving of transportation charges.

Advertise in the papers and otherwise secure competition among outside purchasers. The expense will be small and outside buyers will thus learn of chances to bid on timber in competition with local buyers.

Secure bids whenever practicable both by the lump and by log-scale measure. A choice is thus offered and the more profitable form of bid can be accepted.

Consider the responsibility of the prospective purchaser before making the sale in order to avoid slow payment, costly collections, and losses.

Before making sales, secure at least a fairly good estimate of the amount and value of the material for sale. Foresters either public or private who are acquainted with the business of measuring or estimating timber can usually be found in every region where timber has been handled in the past.

Market the high grades of timber instead of using them on the farm where cheap material will prove as serviceable. Markets that pay good prices usually buy on grade and inspect closely.

Remember that standing timber does not deteriorate rapidly nor do the uses of wood change greatly within a few years. The owner, therefore, is not forced to sell his product regardless of market conditions.

Use a written timber-sale agreement in selling farm timber, particularly where the cutting is done by the purchaser.

When in doubt about how to grow, manage, harvest, or sell woodland products, consult your local farm forester, the county agent, or a private practicing forester.

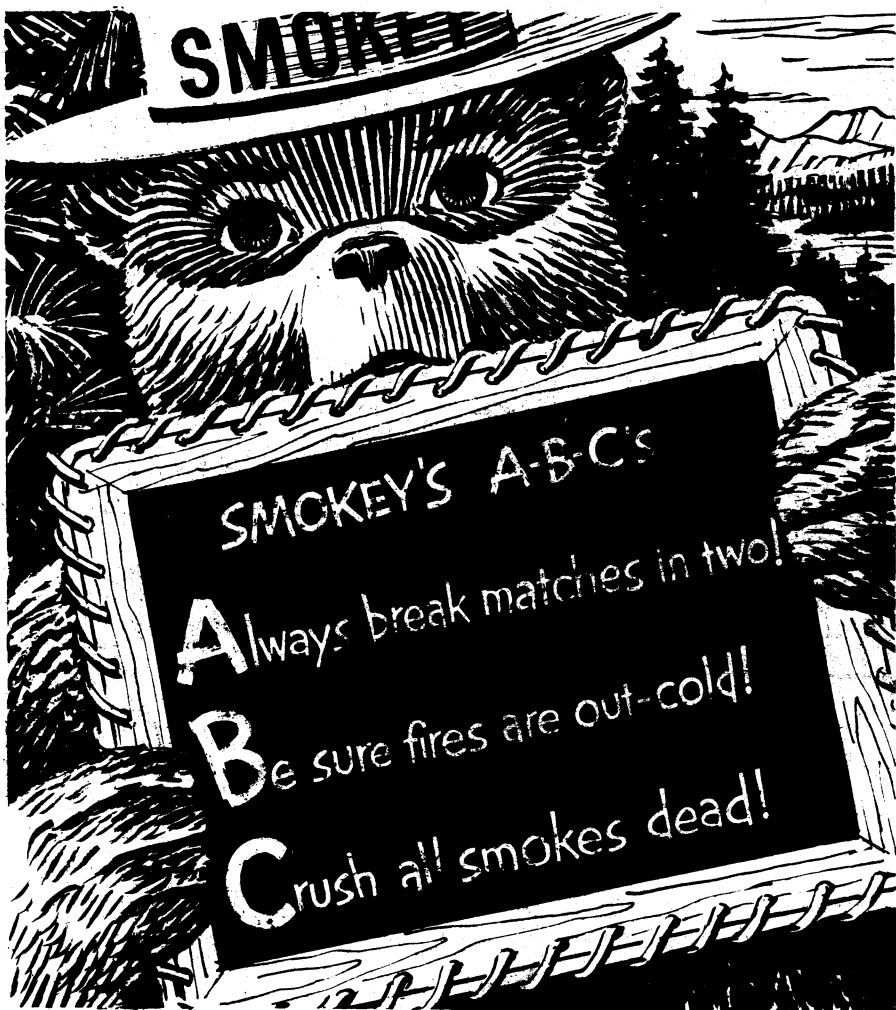
SUPPLEMENTARY MOTION PICTURES

EASIER WAYS OF LOGGING, a 26-minute motion picture in full color, emphasizes safe, economical logging methods for small woodland owners. Requests for loan of this 16-mm. film (released in 1952) may be sent to the Forest Service, U. S. Department of Agriculture, Atlanta 23, Ga.; Upper Darby, Pa.; Milwaukee 3, Wis.; or Washington 25, D. C.

OUT OF THE WOODS, a 15-minute motion picture in full color showing proper methods of measuring and marketing timber from

small woodlands. Requests for loan of this 16-mm. film (released in 1955) may be sent to the Forest Service, U. S. Department of Agriculture, Washington 25, D. C., or Milwaukee 3, Wis.

THE SMALL SAWMILL, a 20-minute motion picture in full color, shows how a mill operator improves the quality of lumber produced, increases mill efficiency, and lowers accident hazards. Requests for loan of this 16-mm. film (released in 1954) may be sent to the Forest Service, U. S. Department of Agriculture, Washington 25, D. C., or to any regional office of the Forest Service.



**Please! Only you can
prevent forest fires**